I claim:

1. A filter comprising:

at least one multiplier to multiply samples of an input discrete-time signal by a set of filter weights to provide a resulting discrete-time signal, wherein the filter weights are the convolution of a set of Nyquist filter weights with a set of pre-equalizer filter weights; and

at least one adder to add samples of the resulting discrete-time signal.

- 2. The filter as set forth in claim 1, wherein the multipliers are 2 bit by J bit multipliers, where J is greater than two.
- 3. The filter as set forth in claim 1, wherein the input discrete-time signal is a two-bit QAM signal.

4. A modem comprising:

a symbol mapper to provide an input discrete-time signal; and a filter comprising:

at least one multiplier to multiply samples of the input discrete-time signal by a set of filter weights to provide a resulting discrete-time signal, wherein the filter weights are a convolution of a set of Nyquist filter weights with a set of pre-equalizer filter weights; and at least one adder to add samples of the resulting discrete-time signal to provide an output discrete-time signal.

- 5. The modem as set forth in claim 4, wherein the modem is a cable modem.
- 6. The modem as set forth in claim 4, wherein the multipliers are 2 bit by J bit multipliers, where J is greater than two.
- 7. The modem as set forth in claim 4, wherein the input discrete-time signal is a two-bit QAM signal.
- 8. The modem as set forth in claim 4, further comprising:

a modulator to modulate the output discrete-time signal to provide a modulated discrete-time signal;

a digital-to-analog circuit to convert the modulated discrete-time signal to an analog signal; and

a cable interface circuit to propagate the analog signal on a cable.

- 9. The modem as set forth in claim 8, wherein the multipliers are 2 bit by J bit multipliers, where J is greater than two.
- 10. The modem as set forth in claim 8, wherein the input discrete-time signal is a two-bit QAM signal.

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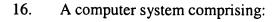
11. A method to provide Nyquist filtering and pre-equalization, the method comprising:

multiplying samples of an input discrete-time signal by a set of filter weights to provide a resulting discrete-time signal, wherein the filter weights are a convolution of a set of Nyquist filter weights with a set of pre-equalizer filter weights; and

adding samples of the resulting discrete-time signal to provide an output discrete-time signal.

- 12. The method as set forth in claim 11, wherein the multiplication is 2 bit by J bit multiplication, where J is greater than two.
- 13. The method as set forth in claim 11, wherein the input discrete-time signal is a two-bit QAM signal.
- 14. The method as set forth in claim 11, further comprising:
 mapping frame symbols into two-bit QAM symbols to provide the input discrete-time signal.
- 15. The method as set forth in claim 14, further comprising:

 modulating the output discrete-time signal to an analog signal; and
 propagating the analog signal on a cable.



a modem comprising

a symbol mapper to provide an input discrete-time signal; and a filter comprising:

at least one multiplier to multiply samples of the input discretetime signal by a set of filter weights to provide a resulting discrete-time signal, wherein the filter weights are a convolution of a set of Nyquist filter weights with a set of pre-equalizer filter weights; and

at least one adder to add samples of the resulting discrete-time signal to provide an output discrete-time signal.

- 17. The computer system as set forth in claim 16, wherein the modem is a cable modem.
- 18. The computer system as set forth in claim 16, wherein the multipliers are 2 bit by J bit multipliers, where J is greater than two.